

REMARKS/ARGUMENTS

Claims 1-13 are currently pending in the above application. For at least the reasons set forth below, applicants submit that the claims are patentably distinguishable over the cited art.

Claims 1-13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,342,199 to Ellis, in view of U.S. Patent Application No. 2004/0191156 to Satchell et. al, or U.S. Patent No. 5,637,285 to Coronell et. al, or U.S. Patent No. 4,091,081 to Woytek et. al.

Claim 1 of the present application is directed to a method for producing nitrogen trifluoride by contacting a fused ammonium fluoride salt with a fluorine gas. The method involves the steps of: forming a stream of micro droplets of the fused ammonium fluoride salt by a rapid ejection of the fused ammonium fluoride salt in a reactor through a nozzle; circulating the fused ammonium fluoride salt from a lower portion to an upper portion of said reactor; and contacting within the stream of micro droplets, the fused ammonium fluoride salt with the fluorine gas. The fluorine gas is sucked in said reactor through a suction pipe for fluorine gas by a negative pressure. The negative pressure formed around the nozzle is a result of rapid ejection of the fused ammonium fluoride salt.

Ellis generally describes a process for conducting an equilibrium chemical reaction including a volatile reactant in a loop reactor. The loop reactor includes a reactor vessel, and a loop connected to the reactor vessel by an outlet and an inlet. It also includes a gas loop separately connected to the vessel for withdrawing and treating the volatile material circulating within the gas loop. The process further includes the steps of circulating the inert gas, feeding volatile material from the gas loop into the reactor vessel, and removing the volatile material from the reactor vessel using the gas loop. Finally, the process is

repeated while also removing a volatile material to influence the equilibrium of the reaction.

Satchell describes a method and an apparatus for producing nitrogen trifluoride, which includes a reactor with a mixing zone, a reaction zone that communicates with the mixing zone, and a product outlet. The apparatus also includes a gaseous fluorine feed supply connected to the reactor's mixing zone, a liquid ammonium acid fluoride feed supply, and a working fluid vapor supply connected to a nozzle to a fluid vapor supply located upstream of the mixing zone of the reactor.

Coronell generally describes a method for the synthesis of nitrogen trifluoride from elemental fluorine gas and a source of ammonia in a gas-liquid phase reaction according to the following formula:



The molar ratio of HF/NH₃ in the above formula is at least 2.55 and the reaction liquid is agitated or mixed with a mixing apparatus with power input to the mixing apparatus at a high level equivalent to or greater than 1000 watts per cubic meter. This improved synthesis method allows for enhanced nitrogen trifluoride yields of 70% or greater.

Woytek generally discloses a process for preparing nitrogen trifluoride that includes the steps of contacting elemental fluorine in vapor phase with liquid phase ammonium acid fluoride. The process is maintained at a temperature from about the melting temperature to a temperature not substantially above 400° F for a time sufficient to effect reaction to form nitrogen trifluoride.

Applicants respectfully submit that the Action fails to set forth a prima facie case of obviousness because neither Ellis, Satchell, Coronell, nor Woytek, alone

or in combination, disclose or suggest all the claim limitations of Applicant's invention.

First, as conceded by the Action, Ellis fails to disclose or suggest all the limitations of applicant's claims. Specifically, Ellis fails to disclose or suggest a method for producing nitrogen trifluoride by contacting a fused ammonium fluoride salt with a fluorine gas to produce nitrogen trifluoride as recited by claim 1. To the contrary, as noted above, Ellis discloses a general process of conducting an equilibrium chemical reaction without specific disclosure or suggestion of any method of producing nitrogen trifluoride, much less for purposes remotely analogous to Applicants' disclosure.

Satchell fails to cure the above deficiencies because Satchell is not a proper prior art reference against Applicants' invention. The present application has a filing date of July 16, 2003, which predates Satchell's filing and publication dates of December 12, 2003, and June 24, 2004, respectfully. Thus, the Action's reliance on Satchell as a reference is without legal basis under U.S. Patent Law and should be withdrawn.

Coronell fails to also cure the above deficiencies of Ellis because Coronell fails to disclose or suggest all the elements of Applicants' claim 1. As described above, Coronell discloses a process for synthesizing nitrogen fluoride in a reactor vessel containing ammonium bifluoride and HF. This liquid is rapidly stirred while gaseous F₂ is passed into the liquid through a sparger, allowing the F₂ to react with the ammonium poly (hydrogen fluoride) complex to form nitrogen fluoride (Col. 4, line 34-36).

In contrast to Coronell's process, which requires turbine-generated rapid stirring forces, Applicants' invention provides a more efficient method of contacting the reactants to achieve high yields of nitrogen fluoride. Specifically, Applicants' claimed invention provides for the contact of fluorine gas within the

stream of micro droplets of fused ammonium fluoride, in a reactor, thereby increasing contact efficiency and producing a high yield of nitrogen fluoride. In addition, unreacted fluorine is returned to the reactor where it is continuously circulated and reacted with the micro droplets of ammonium fluoride salt. Such yields are not achievable with Coronell, absent the necessary use of a turbine, stirrer, or agitation. (Col. 5, lines 46-55). Accordingly, Coronell fails to render obvious Applicants' claim 1 because Coronell fails disclose all the features of claim 1.

Woyteck also fails to cure the deficiencies Ellis and Coronell because Woyteck fails to disclose claim 1. As described above, Woyteck discloses a method for preparing nitrogen fluoride which includes the step of contacting elemental fluoride in it's vapor phase with a liquid phase of ammonium acid fluoride maintained at 400° F. In contrast to claim 1, Woyteck fails to disclose Applicants' above-described efficient method of contacting fluorine gas within a stream of micro droplets of fused ammonium fluoride salt which achieves higher contact efficiency and nitrogen fluoride yields. Without this suggestion or disclosure, it is therefore not surprising that Woyteck fails to disclose a reactor for such a reaction, or the subsequent steps of circulating the fused ammonium fluoride salt within the reactor. Thus, Woyteck also fails to render obvious claim 1.

In response to the Action's identification of other references, which disclose additional methods for preparing nitrogen trifluoride, Applicants' respectfully point out that none of these publications alone or in combination, anticipate or render obvious Applicants' claimed invention because they fail to disclose or suggest Applicants' recited invention.

Therefore, since Ellis, Coronell, or Woyteck, again Satchell is not a proper reference, taken alone or in combination, fail to disclose or suggest Applicant's claimed invention, Applicants respectfully submit that the Action has failed to set

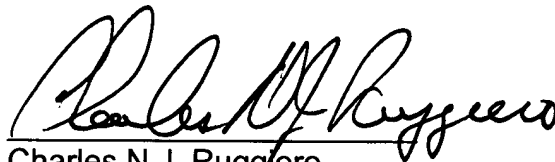
forth a prima facie case of obviousness. Accordingly, reconsideration of the 103(a) rejection of claims 1-13 is respectfully requested.

Applicant's respectfully submit that the present invention, as recited by Independent claims 1-13, would not be obvious to a skilled artisan relying on the combination of Ellis, Satchell, Coronell, or Woyteck because the proper references fail to disclose or suggest all the features of Applicants' claim 1. .

Accordingly, applicants respectfully submit that all claims presented in the pending application are patentably distinguishable over the cited combination of prior art. As such, passage of this application to Allowance is earnestly requested.

Respectfully submitted,

July 20 2005



Charles N.J. Ruggiero
Attorney for Applicants
Reg. No. 28,468
Ohlandt, Greeley, Ruggiero
& Perle, L.L.P.
One Landmark Square, 10th Floor
Stamford CT 06901-2682
Tel: 203-327-4500
Fax: 203-327-6401